Memorandum

Michael Lindgren
Chief Accelerator Officer

Accelerator Division
P.O. Box 500, MS 306
Kirk Road and Pine Street
Batavia, Illinois 60510-5011
USA
Office: 630.840.8409
mlindgre@fnal.gov

Date: November 5, 2020

To: Todd Sullivan

From: Mike Lindgren

Michael Lindgren, UID:mlindgre
Digitally signed by Michael Lindgren, UID:mlindgre
Date: 2020.11.05 11:10:27 -06'00'

Re: Approval for Running NIF

Safety documentation and procedures for restart of beam operations in the low energy Linac are now complete and in place. Therefore, you are hereby authorized to deliver beam to NIF.

cc: M. Convery
P. Czarapata
T. Kroc
S. McGimpsey
E. McHugh
M. Schoell
C.Y. Tan

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ADAP-11-0001
REV. 9

SYSTEM START-UP SIGN-OFF

The signatures below, unless noted in the comments section, indicate that the relevant systems are ready for the restart of beam operation. Indicate in the comments section any remaining work that would affect the restart of beam operations. Indicate N/A for departments that did not do any work on the system.

SYSTEM BEING SIGNED OFF: (Circle as Applicable)
Linac (NIF) MTA Booster [8-GeV Line-MI-10 Region] [MI-20-MI-62/Recycler] BNB NuMI P1-P2 Muon P3-Switchyard Meson Primary MT MC NM FAST _____

DEPARTMENT	DATE	SIGNATURE (Department Head/Designee)
1. Controls	10/8/20	
2. Cryogenics		N/A
3. E/E Support	10/7/20	Madelyn Schoell, UID:maddiew Digitally signed by Madelyn Schoell, UID:maddiew Date: 2020.11.05 10:07:03 -06'00'
4. RPO Manager	11/5/20	
5. LSO		N/A
6. External Beamlines		N/A
7. Instrumentation	10/9/2020	
8. Interlocks	9/24/2020	
9. Main Injector		N/A
10. Mechanical Support	8 Oct 2020	
11. Muon		N/A
12. Operations	10/26/2020	
13. Proton Source	07 Dec 2020	
14. RF		N/A
15. ENG Support	08 oct 2020	
16. Target Systems		N/A
17. Shutdown Coordinator	10/7/2020	

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Comments and special conditions (please mark comment with department # to connect comment with appropriate department):

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The LINAC - NIF radiation shielding meets the requirements documented in the LINAC SHIELDING ASSESSMENT (SEE LINAC SIGN OFF SHEET) AND 1992 "NEUTRON THERAPY FACILITY 1992 SHIELDING ASSESSMENT" shielding assessment.

FINAL APPROVALS

System Department Head Thomas Kroc Digitally signed by Thomas Kroc Date: 2020.11.05 11:03:54 -06'00' Date _____

Assigned RSO Susan McGimpsey Digitally signed by Susan McGimpsey Date: 2020.11.05 11:07:09 -06'00' Date _____

AD Division Head Michael Lindgren, UID:mlindgre Digitally signed by Michael Lindgren, UID:mlindgre Date: 2020.11.05 11:20:20 -06'00' Date 11/5/20

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BEAM PERMIT
11/5/2020

NIF Accelerator Safety Envelope (ASE) Limit

The maximum beam intensity transmitted through the NIF Beamline is limited to:
6.70×10^{18} protons/hr at 66 MeV

No accelerator or beam line will transmit beam without an operational beam interlock safety system.

NIF Beamline Operating Limits

The maximum beam intensity transmitted through the NIF Beamline is limited to:
6.70×10^{17} protons/hr at 66 MeV

Example: Particles/hr = current (mA) x pulse length (μsec) x number of pulses/hr x 6.25×10^{9}

46.44 mA of beam with pulse length 57 μsec at 15 pulses/sec for 45 minutes in one hour:
(46.44 mA x 57 μsec x [15 pulses/sec x 2700 sec/hr] x $6.25 \times 10^{9} = 6.70 \times 10^{17}$ particles/hour)

Special conditions and comments:

Reviewed by Todd Sullivan — Digitally signed by Todd Sullivan Date: 2020.11.05 11:19:54 -06'00'
Operations Department Head

Reviewed by Thomas Kroc — Digitally signed by Thomas Kroc Date: 2020.11.05 11:15:06 -06'00'
Systems Department Head

Reviewed by Susan McGimpsey — Digitally signed by Susan McGimpsey Date: 2020.11.05 11:16:43 -06'00'
Assigned RSO

Reviewed by Madelyn Schoell, UID:maddiew — Digitally signed by Madelyn Schoell, UID:maddiew Date: 2020.11.05 10:07:35 -06'00'
ES&H Radiation Physics Operations Department Head

Approved by Michael Lindgren, UID:mlindgre — Digitally signed by Michael Lindgren, UID:mlindgre Date: 2020.11.05 11:21:41 -06'00'
Accelerator Division Head

Operator Signatures

Crew Chiefs

11/5/20

11/05/2020

6 Nov 20

11/7/20

Crew A

11-5-20

11-5-20

11-5-20

11/5/2020

11/2/20

Crew B

Matilda Mwaniki 11/6/2020

6 Nov 20

11/6/20

11/6/20

Crew C

11/11/20

11/11/20

11/11/20

11/11/20

11/18/2020

Crew D

11/5/20

11/5/20

11/5/20

Crew E

11/8/20

11/8/20

11/8/2020

Nov 08, 2020

Other

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Running Condition
NIF

November 5, 2020

	Area RSO	Sue McGimpsey
Mode of Operation	Full Operation	
Beam Limits	**Beam Energy**	**ASE Limit**	**Operating Limit**
	66 MeV	6.70 E18 protons/hr	6.70 E17 protons/hr
Critical Devices	L:C58DEG and L:C32DEG bend magnets	
Enclosures Protected	NIF (NTF) Treatment Room, LL Gallery North Cage	
Preferred Monitoring Devices*	Intensity is monitored via L:CINT	

*Other methods of monitoring intensity may be used.

Requirements

Access Devices	The L:C58DEG and L:C32DEG bend magnets must be disabled to enter the NIF Treatment Room or the fenced area located in the Lower Linac Gallery, north side of NIF.
Cool Off Period	none
Special Interlocks	The CDC Inputs including failure mode devices may all be found on the Safety System Status pages. The NIF Critical Devices are hardware permitted to the NIF treatment Room Poly door, Timer, and the Lower Linac Gallery fenced area Stone/Gate, Crash Button, Linac, Ground Fault.
Special Concerns	Any work performed on critical devices or obtaining a critical device key requires prior RSO approval.
Gates, Fencing and Passive Shielding Requirements	There is no access to radiologically fenced areas without prior RSO approval. All gates, fencing and passive shielding requirements for Linac Operation must be met, and in accordance with the "Neutron Therapy Facility 1992 shielding assessment", in addition to the requirements listed below while beam is enabled in the NIF Treatment Room (TR). The fence on the roof above the TR must be posted as a Radiation Area and locked with a Radiation Area fence lock. The fence around the passive shielding immediately above the TR be locked with a PAD 111 cored padlock (Neutron Therapy Facility Reset & Enable key). The areas located in the Linac Upper Level Gallery adjacent to the TR on the north and south side must be posted as Radiation Areas by the Proton Source Department, in accordance with the NIF Shielding Assessment, and the fence located in the Linac Lower Level Gallery adjacent to the north and south sides of the TR must be posted as a Radiation Area and locked with a PAD 111 cored padlock by the Proton Source Dept.

Assigned RSO approval also signifies that all necessary Interlock Tests have been completed and Removable Shielding is installed.

Ops. Dept. Head Approval	Todd Sullivan Digitally signed by Todd Sullivan Date: 2020.11.05 11:18:57 -06'00'	**Assigned RSO Approval**	Susan McGimpsey Digitally signed by Susan McGimpsey Date: 2020.11.05 11:17:15 -06'00'
Sys. Dept. Head Approval	Thomas Kroc Digitally signed by Thomas Kroc Date: 2020.11.05 11:14:12 -06'00'	**AD Head Approval**	Michael Lindgren, UID:mlindgre Digitally signed by Michael Lindgren, UID:mlindgre Date: 2020.11.05 11:22:20 -06'00'

Operational Comments

MCR must be appropriately staffed according to the Accelerator Safety Envelope.

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Running Condition
NIF

November 5, 2020

Area RSO Sue McGimpsey

Instrument Information

There are no interlocked detectors that specifically trip the NIF critical devices. Beam to NIF would trip Linac interlocked detectors.

MUX	Type	Location	QF	R/I Mode	Trip Level	CDC	Device(s) Tripped
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note: QF only included for chipmmunks

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Running Condition
NIF

November 5, 2020

Area RSO Sue McGimpsey

Operator Signatures

Crew Chiefs

11/5/20

11/05/2020

14011N 6 Nov 20

11/7/20

Crew A

11-5-20

11-5-20

11-5-20

11/5/2020

11/2/20

Crew B

Matilda Mwaniki 11/6/2020

6 NOV 20

11/6/20

11/6/20

Crew C

11/11/20

11/11/20

11/11/20

11/18/2020

Crew D

11-5-20

11/5/20

11/5/20

Crew E

11/3/20

11/8/20

Nov 08, 2020

11/3/20

Other